ULTRASONICS

Ultrasonic energy is ordinarily transferred through a liquid to the object being treated. An acoustic wave of high intensity is produced at frequencies of 20,000 and 800,000 cps at submicron amplitudes in several commercial sonicators. Violent pressure changes in the liquid disrupt cells and break molecular bonds.

Although sonication is not useful for internal treatment of solid objects, Ney (122) and Dharkar (133) found that sonication enhanced the killing effect of ionizing radiation even under sonication conditions which were not lethal. Licciardello (186) noted that ionizing radiation has been coupled with ultrasonic energy in attempting to improve the quality of radiation sterilized foods by lowering the radiation dose. Heat and radiation seemed to be a more promising system.

Dalzell et al. (183) found Micrococcus pyogenes var. aureus to be more resistant to sonication than Escherichia coli. Lethal effects were independent of temperature in the range 15-45 C.

Wilson and Curtis (184) described ultrasonic radiation effects on yeast and mammalian tissues.

Berliner and La Rochelle (185) could not detect cell damage in the luminescent fungus Armillaria mellea after 1 sec to 10 min

exposure to 20,000 cps but light emission increased up to 400 percent in several exposures.

Small modules or components which are sensitive to heat, radiation, or gaseous sterilants could be surface sterilized in a short time by ultrasonic energy. It is likely that mild sonication would promote the efficiency of a liquid sterilant so that surface sterilization time could be reduced. A brief research study would be necessary to confirm this view. A system utilizing ultrasonics and a germicide might prove acceptable for sterilizing the exterior of a quarantined spacecraft. The higher frequencies are probably most efficient. Sonication may be helpful in destroying fecal microorganisms in a life support system involving reclamation of water or nutrients in feces (12).